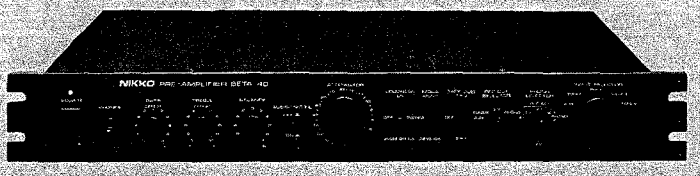
NIKKO PRE AMP

BETA 40

STEREO PRE-AMPLIFIER



TYPE AND VOLTAGE

W-TYPE:	UL and CSA type	120V AC
E -TYPE:	NK-STD type	220V AC
B -TYPE:	BS type	240V AC

SERVICE MANUAL

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BETA 40

SPECIFICATIONS

Pre Amplifier Section

Total Harmonic Distortion (20 to 20,000 Hz),
- Phono (MC) to Tape Out (at 2 V output) ..... no more than 0.004 %
- Phono (MM) to Tape Out (at 2 V output) ..... no more than 0.004 %
- Aux to Pre Out (at 4 V output) ..... no more than 0.004 %

Input Sensitivity (1,000 Hz, 1 V output),
- Phono (MC): ..... 0.2 mV ± 2 dB
- Phono (MM): ..... 2.0 mV ± 2 dB
- Tuner: ..... 110 mV ± 2 dB
- Aux: ..... 110 mV ± 2 dB
- Tape 1, 2: ..... 110 mV ± 2 dB

Input Impedance (1,000 Hz),
- Phono (MC): ..... 100 ohms ± 2 dB
- Phono (MM): ..... 22/47/100 kohms ± 2 dB
- Tuner: ..... 47 kohms ± 2 dB
- Aux: ..... 47 kohms ± 2 dB
- Tape 1, 2: ..... 47 kohms ± 2 dB

Output Level (1,000 Hz, 2 mV Phono input),
- Tape Out: ..... 108 mV ± 2 dB
- Pre Out: ..... 1000 mV ± 2 dB

Output Impedance (1,000 Hz),
- Tape Out: ..... 2.2 kohms ± 2 dB
- Pre Out: ..... 100 ohms ± 2 dB

Signal to Noise Ratio with IHF-A Network,
- Phono (MC): ..... more than 65 dB
- Phono (MM): ..... more than 77 dB
- Tuner: ..... more than 100 dB
- Aux: ..... more than 100 dB
- Tape In 1, 2: ..... more than 100 dB

Frequency Response (10 to 100,000 Hz),
- Tuner: ..... ±1.0 dB
- Aux: ..... ±1.0 dB
- Tape In 1, 2: ..... ±1.0 dB

RIAA Equalization Deviation (30 to 15,000 Hz),
- Phono (MM) to Tape Out: ..... ±0.5 dB

Tone Controls,
- Bass (50 Hz): ..... +9, –8 dB
- Treble (10,000 Hz): ..... +10, –8 dB

Subsonic Filter: ..... 15 Hz, 12 dB/oct.

Loudness Control (–30 dB Attenuator position),
- 70 Hz: ..... 11 ± 2 dB
- 10,000 Hz: ..... 5 ± 2 dB

Bass Boost (–30 dB Attenuator position),
- 70 Hz: ..... 11 ± 2 dB

Mute Time: ..... 7 ± 2 seconds

General

Power Requirement,
- U. S. A. & Canada model: ..... AC 120V/60 Hz
- European model: ..... AC 220V/50 Hz
- U. K. model: ..... AC 240V/50 Hz

Power Consumption: ..... 34 watts

Dimensions,
- Width: ..... 482 mm, 19 inches
- Height: ..... 70 mm, 2-3/4 inches
- Depth: ..... 330 mm, 13 inches

Weight,
- Without package: ..... 6.4 kg, 14 lbs
- With package: ..... 7.8 kg, 17.1 lbs

*Specifications are subject to change without notice.

BLOCK DIAGRAM

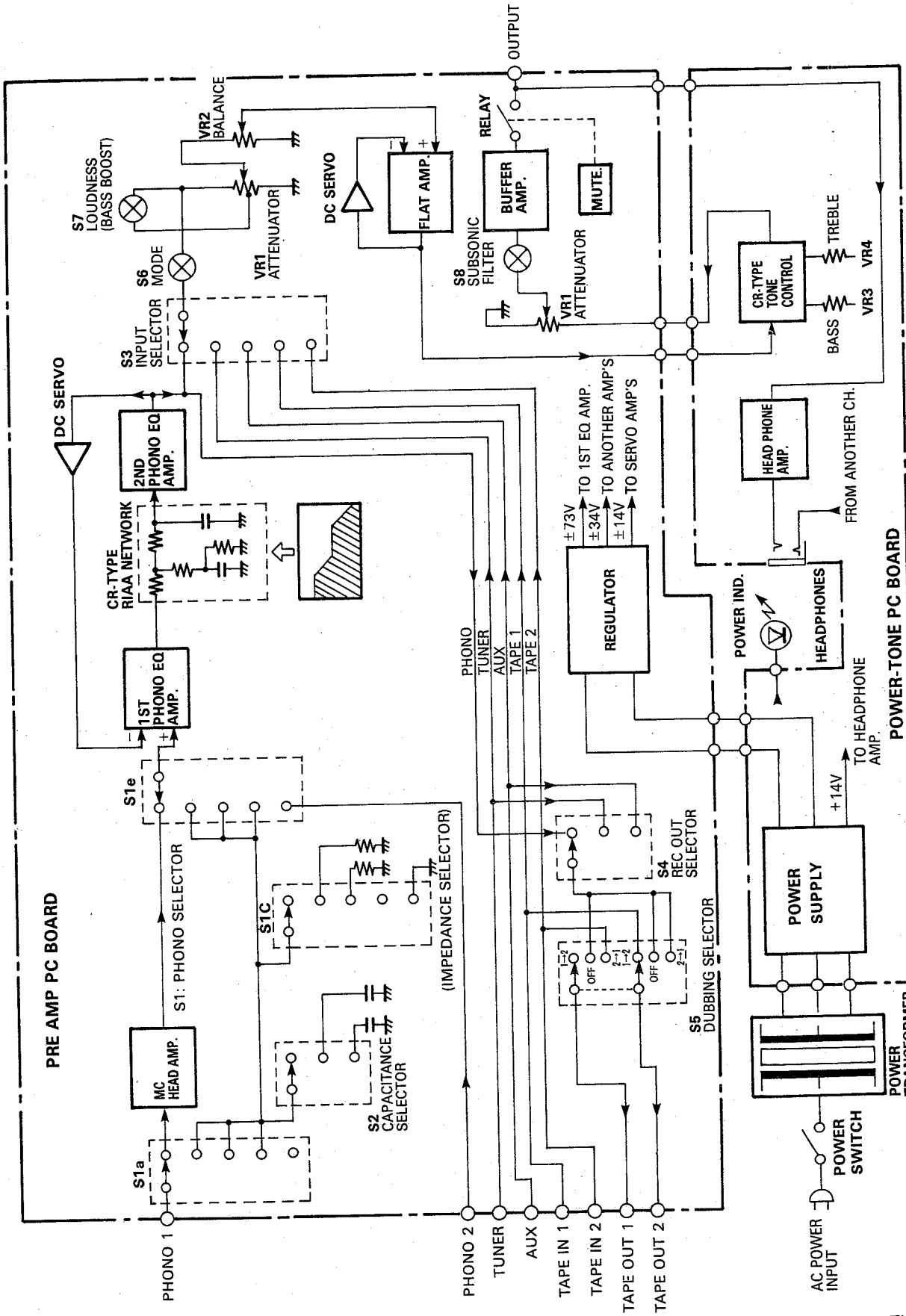


Figure 1

DISASSEMBLY

1. CABINET COVER REMOVAL
   a. Remove four tapping screws from the top of the metal cover.
   b. Remove four screws from both sides of the metal cover.
   c. Lift the cabinet cover away from the unit.

2. BOTTOM PLATE REMOVAL
   a. Remove eight tapping screws (#1 ~ #8) as shown in Photo 1.

3. FRONT PANEL REMOVAL
   a. Remove two knobs (#1 and #2) (Photo 2) from the front panel by pulling them forward.
   b. Using a hexagonal wrench, remove five knobs (#3 ~ #7) as shown in Photo 2.
   c. Remove two nuts (#8 and #9) (Photo 2) and lift out the front panel.

4. POWER TRANSFORMER REMOVAL
   a. Disconnect all wires from the power transformer.
   b. Remove two screws (#10 and #13) (photo 2) and lift the power transformer up and out of chassis.

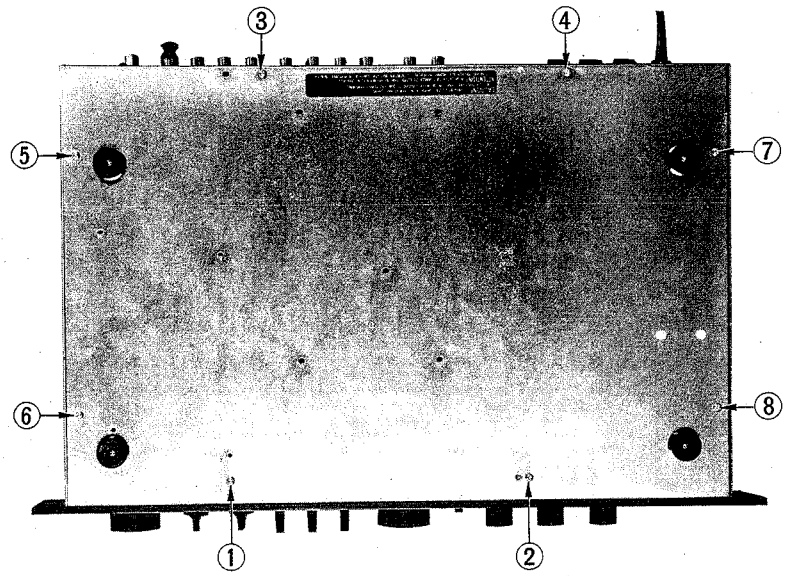


Photo 1

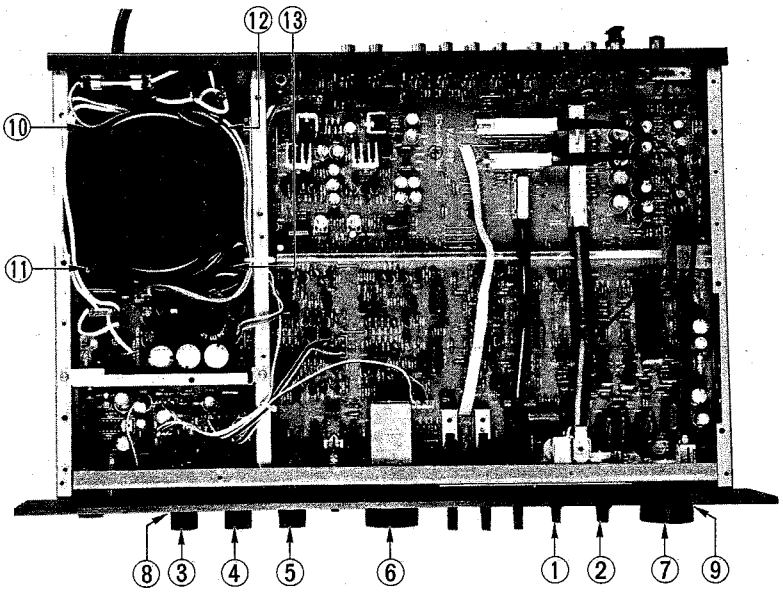


Photo 2

ALIGNMENT

GENERAL ALIGNMENT INSTRUCTIONS

1. Allow a minimum of 10 minutes warm-up for the unit.
2. When adjusting, voltmeter's needle may swing backward. In this case, simply reverse the voltmeter connection.

DC BALANCE ADJUSTMENT (EQ AMP SECTION)

1. Set the Phono Selector Switch to "PHONO 1 47 kohm" position.
2. Insert short-pin-plugs to the PHONO 1 input terminals on the rear panel.
3. Connect a DC voltmeter to the test points TP27 and 28 on the Pre Amp PC Board.
4. Adjust the potentiometer R309 so that the DC voltmeter indicates 0 ± 0.5 mV. (refer to Photo 3)
5. Similarly connect the DC voltmeter to the test points TP28 and 29, then adjust the potentiometer R310 as same as above.
   (R309 is for the left channel and R310 is for the right.)

DC BALANCE ADJUSTMENT (FLAT AMP SECTION)

1. Set the Input Selector Switch to "AUX" position.
2. Turn the "Attenuator" fully counter clockwise and set it to the minimum position.
3. Connect a DC voltmeter to the test points TP7 and 8.
4. Adjust the potentiometer R321 until the voltmeter indicates 0 ± 0.5 mV.
5. Similarly connect the DC voltmeter to the test points TP8 and 9. And adjust the potentiometer R322 to 0 ± 0.5 mV voltmeter indication.
   (R321 is for the left channel and R322 is for the right.)

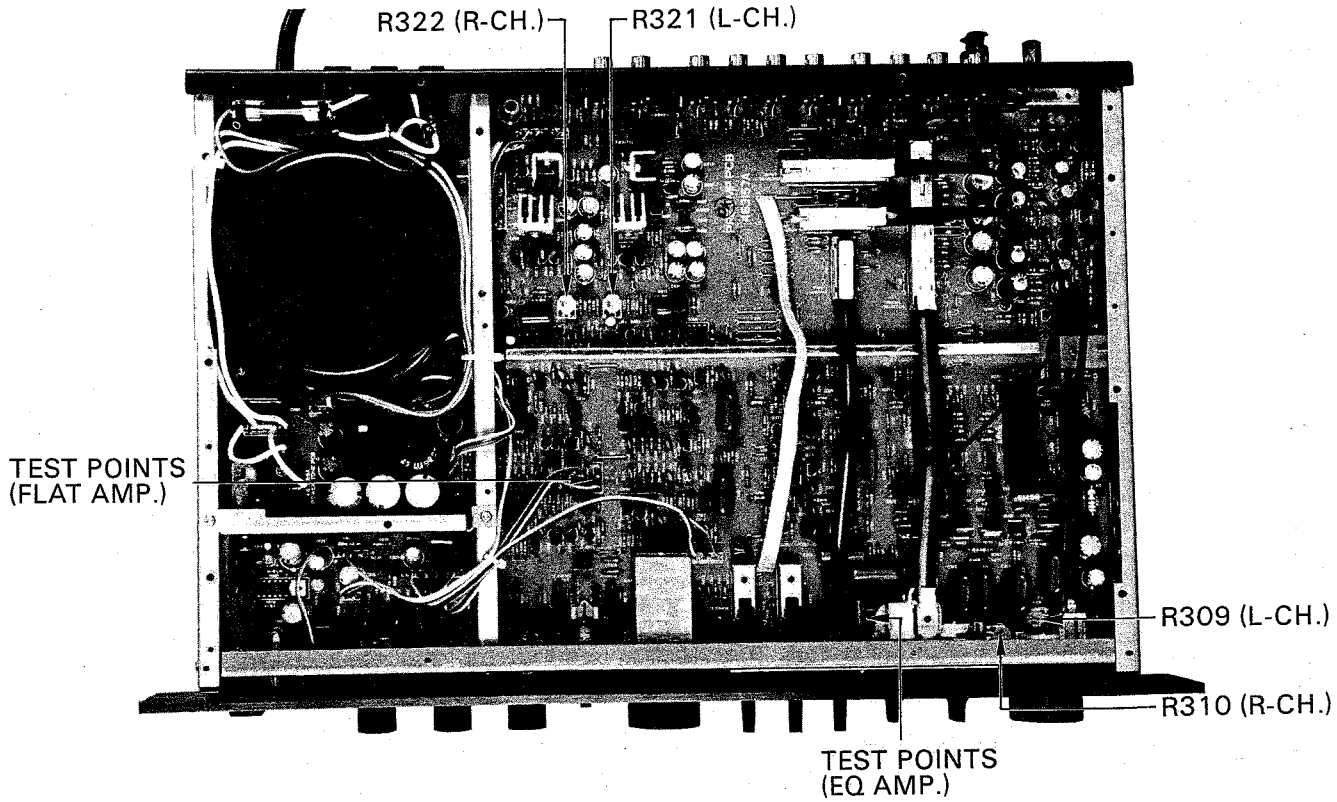


Photo 3

PARTS LOCATION

NOTE: Numbers of threes digits with a ◯ are related to the KEY NUMBER on parts list.

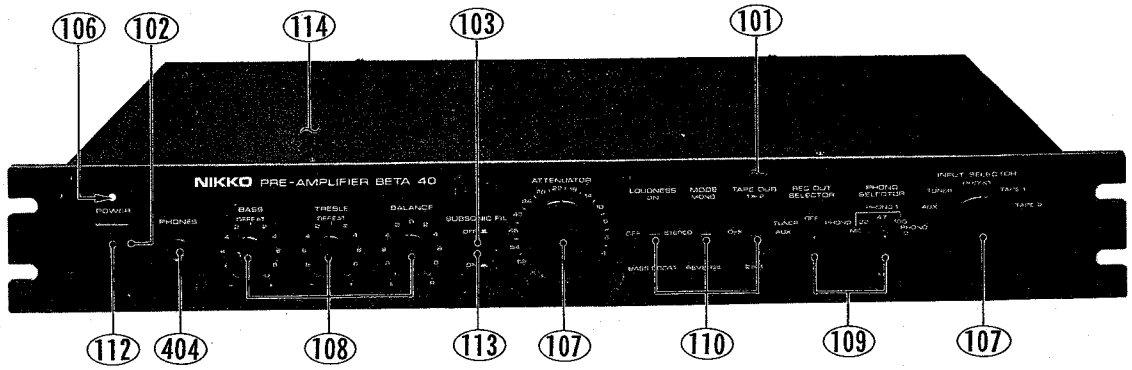


Photo 4

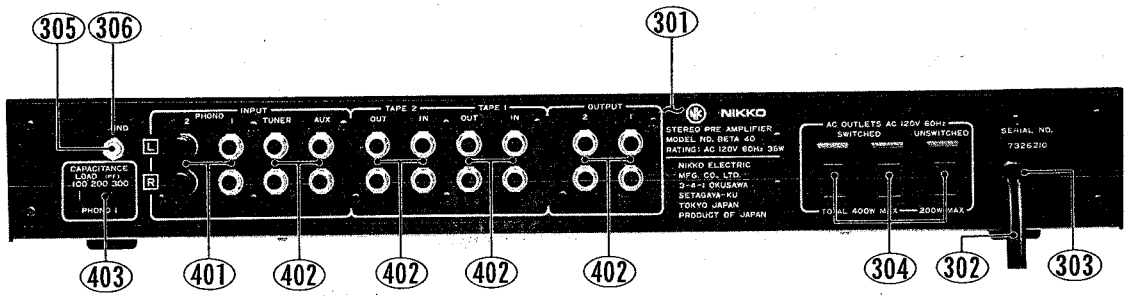


Photo 5

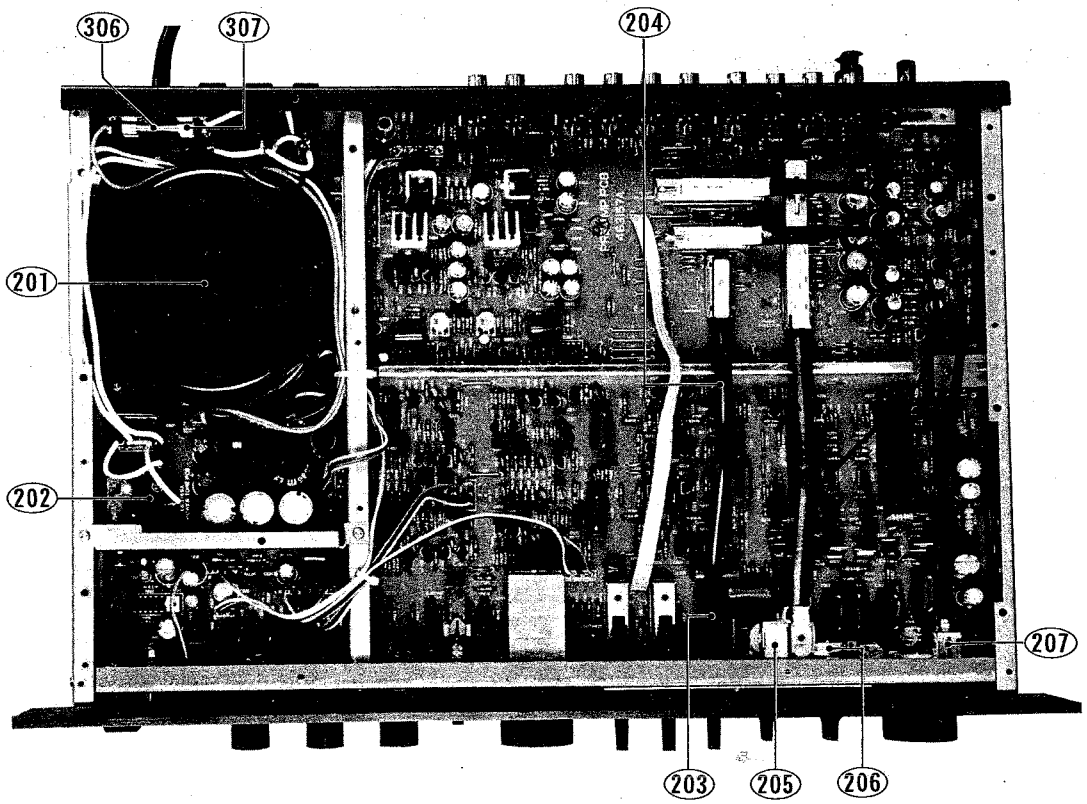
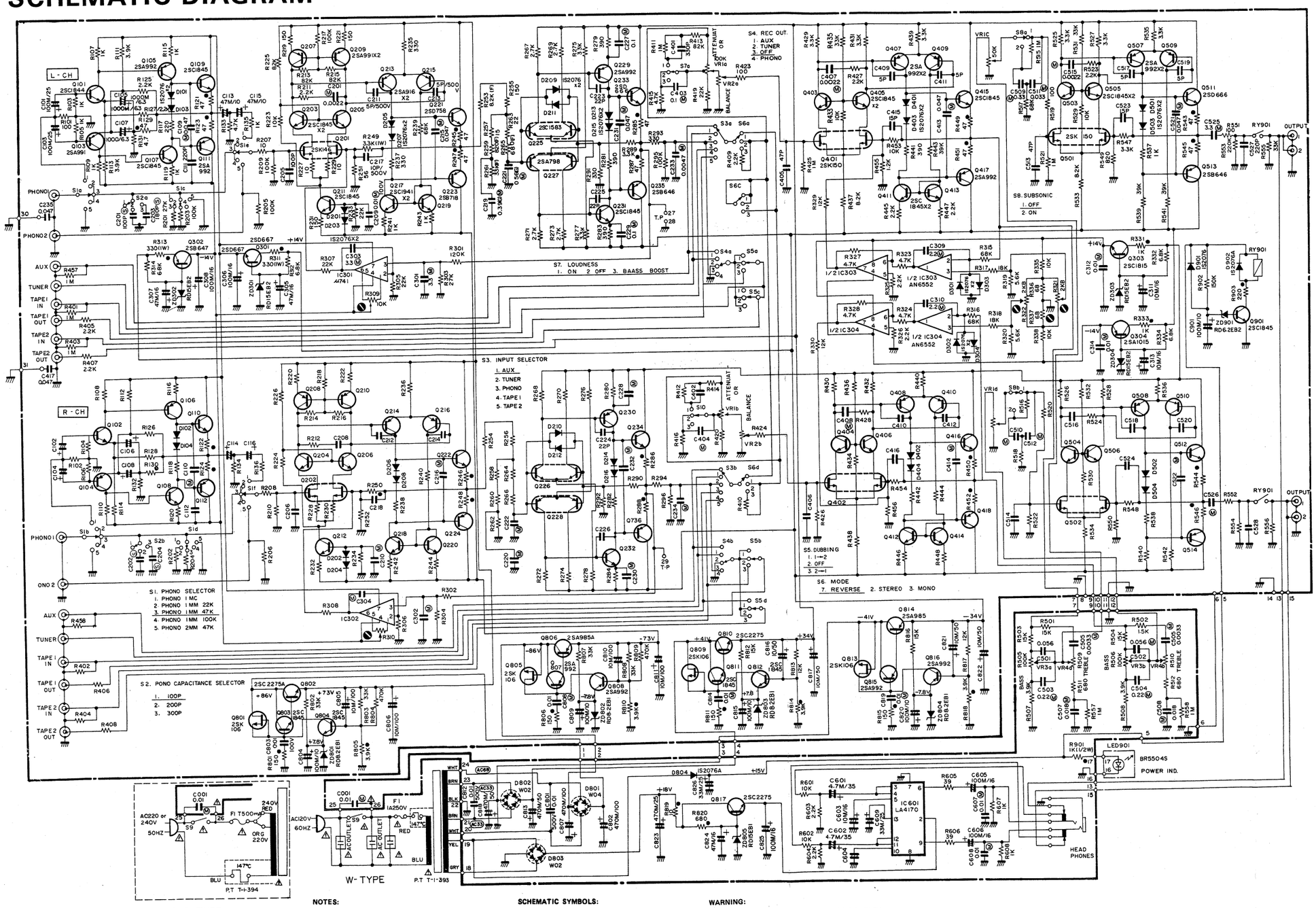


Photo 6

SCHEMATIC DIAGRAM



SEMICONDUCTORS

2SA991	2SC1815
2SA992	2SC1844
2SA1015	2SC1845
2SB646	2SD666
2SB647	2SD667
2SA798	2SC1583
2SA916	2SC1941
2SB718	2SD758
2SA985	2SA985A
2SC2275	2SC2275A
2SK106	
2SK150	
SUB.	
2SK146	
1S2076	1S2076A
RD6.2EB2	
RD8.2EB1	
RD15EB1	
RD15EB2	

NOTES:

1. SCHEMATIC IS SUBJECT TO CHANGE WITHOUT NOTICE.

UNLESS OTHERWISE SPECIFIED:

2. RESISTANCE VALUES ARE IN OHMS. K = 1,000 ; M = 1,000,000
3. CAPACITANCE VALUES 1.0 AND ABOVE ARE IN pF OR μF (P = pF, M = μF), LESS THAN 1.0 ARE IN μF. (ELECTROLYTIC CAPACITANCE VALUES ARE IN μF/WV.)

SCHEMATIC SYMBOLS:

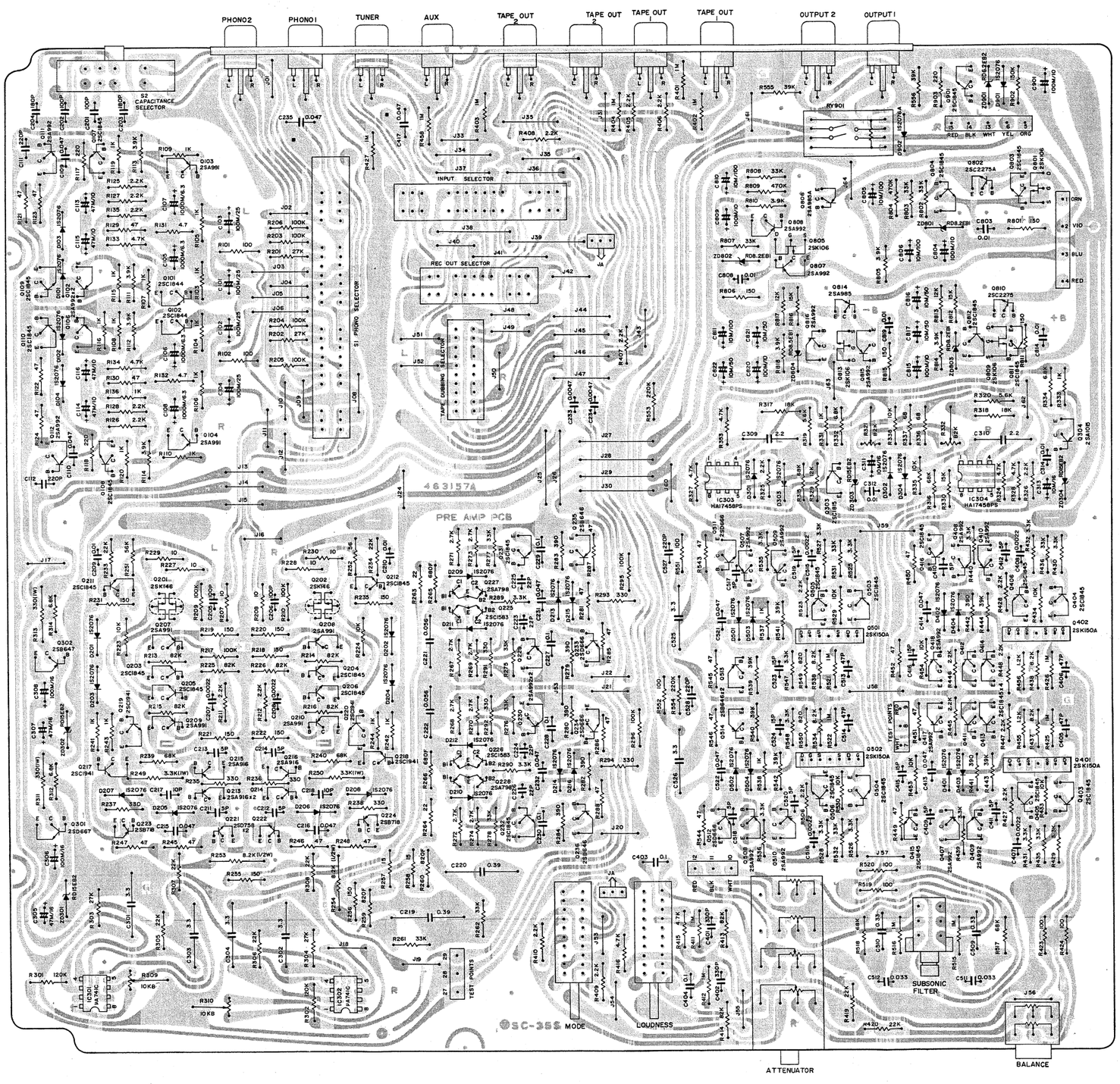
Ⓜ POLYESTER FILM CAPACITOR
Ⓢ POLYSTYRENE FILM CAPACITOR
● NONFLAMMABLE RESISTOR

WARNING:

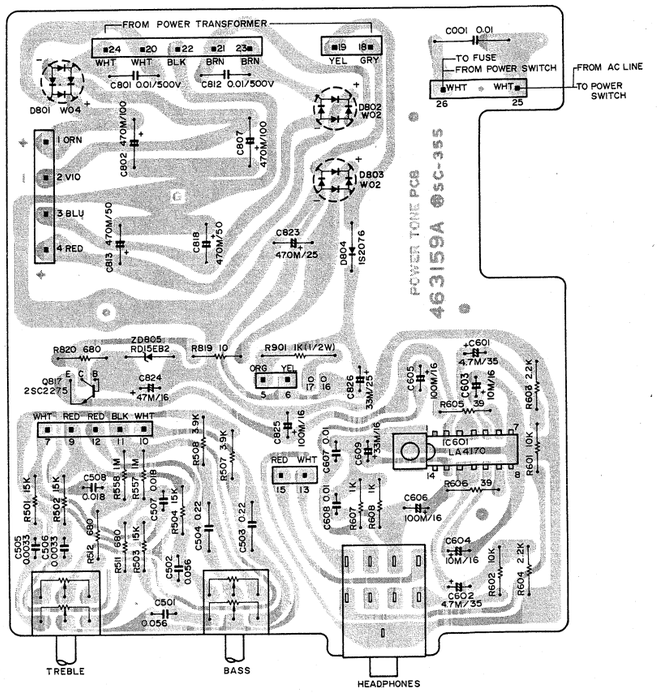
⚠ INDICATES SAFETY CRITICAL COMPONENTS.
FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.

Figure 2

P.C. BOARD (BOTTOM VIEW)



PRE-AMP PCB



POWER TONE PCB

Figure 3

PARTS LIST

NOTES:

1. ★ The KEY NUMBER (#) marked with a (★) on parts list relate to number of three digits with a (◯). (Photo 4~6)
2. + Numberals in file indicate the quantity of parts used in one type.
3. ++
   - TR : Transistor
   - FET : Field effect transistor
   - VR : Volume control (Variable resistor)
   - RES : Carbon film fixed resistor
   - MO-RES : Metal oxide film fixed resistor
   - CEM-RES : Cemented wirewound fixed resistor
   - FP : Flame proof
   - C-CAP : Ceramic capacitor
   - E-CAP : Aluminum electrolytic capacitor
   - M-CAP : Polyester film capacitor
   - S-CAP : Polystyrene film capacitor
   - T-CAP : Tantalum electrolytic capacitor
   - BP-CAP : Bipolar electrolytic capacitor
   - LC-CAP : Low current leakage electrolytic capacitor.
4. Assemblies and parts are subject to change without notice.
5. Parts ordering procedure:
   - A. DO NOT USE THE "KEY" NUMBER AND "SYMBOL" NUMBER. (these are control # for the factory only)
   - B. Include in any order
     - a. Part number.
     - b. Part description.
     - c. Model number.

     (any of the above lacking from an order may delay shipment of that order.)

CAUTION:

The ⚠ mark, the KEY NO. and the SYMBOL NO. circled with rectangle in the schematic diagram and the shaded area in the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list.

KEY NO.	SYMBOL NO.	TYPE+ W E B	DESCRIPTION++	PART NO.
			PACKING MATERIALS & ACCESSORIES	
001		1 1 1	Carton box	9825700
002		2 2 2	Pad	9840930
003		1 1 1	Sack, polyethylen cloth	9640720
004		1 1 1	Sack, polyethylen cloth – #13	9640320
005a		1 – –	Manual, instructions – in English and French	960332E
005b		– 1 1	Manual, instructions – in five different languages	960333K
006		1 – –	Card, warranty	967010A
007		1 – –	Manual, safety instructions	9670410
008		1 – –	List, service stations	9690210
009		1 1 1	Cord, RCA phono pin plug – 2T-1 (NK)	962014A
010		2 2 2	Short pinn plug	4440180
			CABINET ASSEMBLY	
	★101a	1 1 1	Panel, front – SILVER	7884960
	★101b	1 1 1	Panel, front – BLACK	7884970
	★102	1 1 1	Guide, button – P15SQ-BK – power switch	7402680
	★103	1 1 1	Guide, button – subsonic filter	7401560
	104	1 1 1	Stopper, button – subsonic filter	7401460
	105	1 1 1	Spring – (W)	7440420
	★106	1 1 1	Globe, LED – power indicator	7402120
	★107a	2 2 2	Knob – 2GL-34D – attenuator/input selector, SILVER	7851460
	★107b	2 2 2	Knob – 2BK-34D – attenuator/input selector, BLACK	7851740
	★108a	3 3 3	Knob – 2GL-18D – bass/treble/balance, SILVER	7851480
	★108b	3 3 3	Knob – 2BK-18D – bass/treble/balance, BLACK	7851780
	★109	2 2 2	Knob – P2BK-1613DL – rec out/phono selector	7852350
	★110a	3 3 3	Knob, lever – P4525SGL – SILVER	7852580
	★110b	3 3 3	Knob, lever – P4525BLK – BLACK	7852370
	111a	3 3 3	Blind, lever knob – SILVER	7002480
	111b	3 3 3	Blind, lever knob – BLACK	7002490
	★112a	1 1 1	Button, push – M15SQ-GL – power, SILVER	7852380
	★112b	1 1 1	Button, push – M15SQ-BK – power, BLACK	7852390
	★113	1 1 1	Button, push – P5 – subsonic filter	7401550
	★114a	1 – –	Cover, top	7820870
	★114b	– 1 1	Cover, top – (D)	7820880
	★115	1 1 1	Plate, bottom	7326980
	★116	4 4 4	Foot, polyethylen – 22φ x 10	7401350
			CHASSIS ASSEMBLY	
⚠	★201a	1 – –	Transformer, power – T-1-393 – AC120V	1103930
⚠	★201b	– 1 1	Transformer, power – T-1-394 – AC220 or 240V	1103940
⚠	★202a	1 – –	Switch, push – U62S-TV-5 – power	4041480
⚠	★202b	– 1 1	Switch, push – ESB-70823S – power	4041600
	★203	1 1 1	Switch, lever – SLL013 – tape dubbing selector	4025500
	★204	1 1 1	Wire, remote control	4582680
	★205	1 1 1	Switch, rotary – ESA-33225B – rec out selector	4051290
	★206	1 1 1	Switch, rotary – ESA-33226B – phono selector	4051280
	★207	1 1 1	Switch, rotary – ESA-33224B – input selector	4051270
			BACK PLATE ASSEMBLY	
	★301a	1 – –	Plate, back – (W)	7326210
	★301b	– 1 1	Plate, back – (E)	7326240
⚠	★302a	1 – –	Cord, AC line – SPT-2	606008A
⚠	★302b	– 1 1	Cord, AC line – CEE-2T	600510A
⚠	★302c	– 1 1	Cord, AC line – BS	600514A
⚠	★303	1 1 1	Bush, power cord – SR4N-4	7400690
⚠	★304	3 – –	Socket – AC outlets	4500150
	★305	1 1 1	Shaft, GND terminal – MK-3	7152050
	★306	1 1 1	Nut, GND terminal – MK-2	7152060
⚠	★306a	1 – –	Fuse – 1A 250V MGC	4700590
⚠	★306b	– 1 1	Midget fuse – T500MA 250V	4720310
⚠	★307a	1 – –	Holder, fuse – 1P	4582590
⚠	★307b	– 1 1	Holder, midget fuse – 1P	4581430
			PRE AMPLIFIER PC BOARD ASSEMBLY	
	★401	1 1 1	Terminal, RCA phono pin jack – 2P x 2, gold plated	4444080
	★402	4 4 4	Terminal, RCA phono pin jack – 2P x 2	4444070
			(MC HEAD AMP SECTION)	
	Q101,102	2 2 2	TR 2SC1844 (E or F)	512106S
	Q103,104	2 2 2	TR 2SA991 (E or F)	510104S
	Q105,106	2 2 2	TR 2SA992 (E or F)	510110S
	Q107~110	4 4 4	TR 2SC1845 (E or F)	512115S
	Q111,112	2 2 2	TR 2SA992 (E or F)	510110S
	D101~104	4 4 4	Diode 1S2076	501019S
	C101~104	4 4 4	E-CAP 100μf 25V	211330Q
	C105~108	4 4 4	E-CAP 1000μf 6.3V	211040Q
	C109,110	2 2 2	M-CAP 0.047μf 10% 50V	222473K
	C111,112	2 2 2	C-CAP 220pf 10% 50V SL	232221K
	C113~116	4 4 4	E-CAP 47μf 10V	211125Q
	R101,102	2 2 2	RES 100ohm 5% ¼W	328101J
	R103~110	8 8 8	RES 1kohm 5% ¼W	328102J
	R111~114	4 4 4	RES 3.9kohm 5% ¼W	328392J
	R115,116	2 2 2	RES 1kohm 5% ¼W	328102J
	R117,118	2 2 2	RES 220ohm 5% ¼W	328221J
	R119,120	2 2 2	RES 1kohm 5% ¼W	328102J
	R121~124	4 4 4	FP-RES 47ohm 5% ¼W	328470L
	R125~128	4 4 4	RES 2.2kohm 5% ¼W	328222J

1 BETA 40

PART ORDERING PROCEDURE ----- DO NOT USE THE "KEY" NUMBER AND "SYMBOL" NUMBER. (these are control # for the factory only.) Include in any order: a. Part number, b. Part description, c. Model number. (any of the above lacking from an order may delay shipment of the order.)

KEY NO.	SYMBOL NO.	TYPE + W E B	DESCRIPTION ++	PART NO.
	R129,130	2 2 2	FP-RES 47ohm 5% ¼W	328470L
	R131,132	2 2 2	RES 4.7ohm 5% ¼W	328478J
	R133,134	2 2 2	RES 4.7kohm 5% ¼W	328472J
	R135,136	2 2 2	RES 1kohm 5% ¼W	328102J
			(EQUALIZER AMP SECTION)	
	S1	1 1 1	Switch, rotary-slide – ESA-2644 – phono selector	4020680
★403	S2	1 1 1	Switch, slide – SSB323 – capacitance load selector	4020650
	Q201,202	2 2 2	FET 2SK146 (GR)	516036S
	Q203~206	4 4 4	TR 2SC1845 (E or F)	512115S
	Q207~210	4 4 4	TR 2SA991 (E or F)	510104S
	Q211,212	2 2 2	TR 2SC1845 (E or F)	512115S
	Q213~216	4 4 4	TR 2SA916 (L or K)	510108S
	Q217~220	4 4 4	TR 2SC1941 (L or K)	512112S
	Q221,222	2 2 2	TR 2SD758 (B or C)	513120S
	Q223,224	2 2 2	TR 2SB718 (B or C)	511117S
	Q225,226	2 2 2	TR 2SC1583 (F or G)	515080S
	Q227,228	2 2 2	TR 2SA798 (F or G)	514086S
	Q229,230	2 2 2	TR 2SA992 (E or F)	510110S
	Q231,232	2 2 2	TR 2SC1845 (E or F)	512115S
	Q233,234	2 2 2	TR 2SD666 (B or C)	511019S
	Q235,236	2 2 2	TR 2SB646 (B or C)	511119S
	D201~216	161616	Diode 1S2076	501019S
	C201,202	2 2 2	S-CAP 100pf 5% 50V	223101J
	C203,204	2 2 2	S-CAP 180pf 5% 50V	223181J
	C205,206	2 2 2	C-CAP 100pf 10% 50V SL	232101K
	C207,208	2 2 2	M-CAP 0.0022μf 10% 50V	222222K
	C209,210	2 2 2	M-CAP 0.01μf 10% 100V	226103K
	C211~214	4 4 4	C-CAP 5pf 10% 500V SL	234509D
	C125,216	2 2 2	M-CAP 0.047μf 10% 50V	222473K
	C217,218	2 2 2	C-CAP 10pf 10% 500V SL	234100D
	C219,220	2 2 2	M-CAP 0.39μf 2% 100V	228394G
	C221,222	2 2 2	M-CAP 0.056μf 2% 100V	228563G
	C223~226	4 4 4	C-CAP 22pf 10% 50V SL	232220K
	C227~230	4 4 4	M-CAP 0.1μf 10% 50V	222104K
	C231,232	2 2 2	M-CAP 0.047μf 10% 50V	222473K
	C233,234	2 2 2	M-CAP 0.0047μf 10% 50V	222472K
	C235	1 1 1	C-CAP 0.0047μf +80, –20% 50V YG	231473Z
	R201,202	2 2 2	RES 27kohm 5% ¼W	328273J
	R203~206	4 4 4	RES 100kohm 5% ¼W	328104J
	R207,208	2 2 2	RES 10ohm 5% ¼W	328100J
	R209,210	2 2 2	RES 100kohm 5% ¼W	328104J
	R211,212	2 2 2	RES 2.2kohm 5% ¼W	328222J
	R213~216	4 4 4	RES 82kohm 5% ¼W	328823J
	R217 218	2 2 2	RES 100kohm 5% ¼W	328104J
	R219~222	4 4 4	RES 150ohm 5% ¼W	328151J
	R223,224	2 2 2	RES 10kohm 5% ¼W	328103J
	R225,226	2 2 2	RES 82kohm 5% ¼W	328823J
	R227~230	4 4 4	RES 10ohm 5% ¼W	328100J
	R231,232	2 2 2	RES 150ohm 5% ¼W	328151J
	R233,234	2 2 2	RES 22kohm 5% ¼W	328223J
	R235~238	4 4 4	RES 330ohm 5% ¼W	328331J
	R239,240	2 2 2	RES 68kohm 5% ¼W	328683J
	R241~244	4 4 4	RES 1kohm 5% ¼W	328102J
	R245~248	4 4 4	FP-RES 47ohm 5% ¼W	328470L
	R249,250	2 2 2	FP-MO-RES 3.3kohm 5% 1W	361332L
	R251,252	2 2 2	RES 56ohm 5% ¼W	328560J
	R253,254	2 2 2	RES, metal film 8.2kohm 1% ¼W	305822F
	R255,256	2 2 2	RES 150ohm 5% ¼W	328151J
	R257,258	2 2 2	RES 15ohm 5% ¼W	328150J
	R259,260	2 2 2	RES, metal film 820ohm 1% ¼W	304821F
	R261,262	2 2 2	RES, metal film 33kohm 1% ¼W	304333F
	R263,264	2 2 2	RES 22ohm 5% ¼W	328220J
	R265,266	2 2 2	RES, metal film 680ohm 1% ¼W	304681F
	R267~274	8 8 8	RES 2.7kohm 5% ¼W	328272J
	R275~278	4 4 4	RES 33kohm 5% ¼W	328333J
	R279~284	6 6 6	RES 390ohm 5% ¼W	328391J
	R285~288	4 4 4	FP-RES 47ohm 5% ¼W	328470L
	R289,290	2 2 2	RES 3.3kohm 5% ¼W	328332J
	R291~294	4 4 4	RES 330ohm 5% ¼W	328331J
			(PHONO SERVO SECTION)	
	IC301,302	2 2 2	IC μA741C	518088S

KEY NO.	SYMBOL NO.	TYPE + W E B	DESCRIPTION ++	PART NO.
	Q301	1 1 1	TR 2SD667 (B or C)	511021S
	Q302	1 1 1	TR 2SB647 (B or C)	510045S
	ZD301,302	2 2 2	Zener diode RD15EB2	502050S
	C301~304	4 4 4	M-CAP 3.3μf 10% 100V	281335K
	C305,307	2 2 2	E-CAP 47μf 16V	211225Q
	C306,308	2 2 2	E-CAP 100μf 16V	211230Q
	R309,310	2 2 2	Potentiometer – 10kohm (B)	4301280
	R301,302	2 2 2	RES 120kohm 5% ¼W	328124J
	R303,304	2 2 2	RES 27kohm 5% ¼W	328273J
	R305~308	4 4 4	RES 22kohm 5% ¼W	328223J
	R311,313	2 2 2	FP-MO-RES 330ohm 5% 1W	361331L
	R312,314	2 2 2	RES 6.8kohm 5% ¼W	328682J
			(FLAT AMP SECTION)	
	S3	1 1 1	Switch, rotary-slide – ESA-26132 – input selector	4020750
	S4	1 1 1	Switch, rotary-slide – ESA-26131 – rec out selector	4020660
	S5	1 1 1	Switch, slide – SSR24302D – tape dubbing selector	4020530
	S6, 7	2 2 2	Switch, lever – SLR843 – mode/loudness	4025490
	VR1	1 1 1	VR AP25G (4R) PHN – 100kohm x 2, 50kohm x 2 – attenuator	4390160
	VR2	1 1 1	VR GM70E926C – 250kohm (M, N) – balance	4321070
	Q401,402	2 2 2	FET 2SK150A (GR)	516038S
	Q403~406	4 4 4	TR 2SC1845 (E or F)	512115S
	Q407~410	4 4 4	TR 2SA992 (E or F)	510110S
	Q411~416	6 6 6	TR 2SC1845 (E or F)	512115S
	Q417,418	2 2 2	TR 2SA992 (E or F)	510110S
	D401~404	4 4 4	Diode 1S2076	501019S
	C401,402	2 2 2	C-CAP 330pf 10% 50V SL	232331K
	C403,404	2 2 2	M-CAP 0.1μf 10% 50V	222104K
	C405,406	2 2 2	C-CAP 47pf 10% 50V SL	232470K
	C407,408	2 2 2	M-CAP 0.0022μf 10% 50V	222222K
	C409~412	4 4 4	C-CAP 5pf 10% 50V SL	232509D
	C413,414	2 2 2	M-CAP 0.047μf 10% 50V	222473K
	C415,416	2 2 2	C-CAP 15pf 10% 50V SL	232150K
	C417	1 1 1	C-CAP 0.047μf +80, –20% 50V YG	231473Z
	R401~404	4 4 4	RES 1meg·ohm 5% ¼W	328105J
	R405~410	6 6 6	RES 2.2kohm 5% ¼W	328222J
	R411,412	2 2 2	RES 1meg·ohm 5% ¼W	328105J
	R413,414	2 2 2	RES 82kohm 5% ¼W	328823J
	R415,416	2 2 2	RES 4.7kohm 5% ¼W	328472J
	R419,420	2 2 2	RES 22kohm 5% ¼W	328223J
	R423,424	2 2 2	RES 100ohm 5% ¼W	328101J
	R425,426	2 2 2	RES 1meg·ohm 5% ¼W	328105J
	R427,428	2 2 2	RES 2.2kohm 5% ¼W	328222J
	R429~432	4 4 4	RES 3.3kohm 5% ¼W	328332J
	R433,434	2 2 2	RES 10kohm 5% ¼W	328103J
	R435,436	2 2 2	RES 33kohm 5% ¼W	328333J
	R437,438	2 2 2	RES 8.2kohm 5% ¼W	328822J
	R439,440	2 2 2	RES 3.3kohm 5% ¼W	328332J
	R441,442	2 2 2	RES 390ohm 5% ¼W	328391J
	R443,444	2 2 2	RES 39kohm 5% ¼W	328393J
	R445~448	4 4 4	RES 2.2kohm 5% ¼W	328222J
	R449~452	4 4 4	FP-RES 47ohm 5% ¼W	328470L
	R453,454	2 2 2	RES 10kohm 5% ¼W	328103J
	R455,456	2 2 2	RES 1.2kohm 5% ¼W	328122J
	R457,458	2 2 2	RES 1meg·ohm 5% ¼W	328105J
			(FLAT AMP SERVO SECTION)	
	IC303,304	2 2 2	IC AN6552	518096S
	Q303	1 1 1	TR 2SC1815 (Y or G R)	512107S
	Q304	1 1 1	TR 2SA1015 (Y or G R)	510102S
	D301~304	4 4 4	Diode 1S2076	501019S

PART ORDERING PROCEDURE ----- DO NOT USE THE "KEY" NUMBER AND "SYMBOL" NUMBER. (these are control # for the factory only.) Include in any order: a. Part number, b. Part description, c. Model number. (any of the above lacking from an order may delay shipment of the order.)

KEY NO.	SYMBOL NO.	TYPE+ W E B	DESCRIPTION++	PART NO.
	ZD303,304	2 2 2	Zener diode RD15EB2	502050S
	C309,310	2 2 2	M-CAP 2.2μf 10% 50V	281225K
	C311,313	2 2 2	E-CAP 10μf 16V	211220Q
	C312,314	2 2 2	M-CAP 0.01μf 10% 50V	222103K
	R321,322	2 2 2	Potentiometer – 2kohm (B)	4301270
	R315,316	2 2 2	RES 68kohm 5% ¼W	328683J
	R317,318	2 2 2	RES 18kohm 5% ¼W	328183J
	R319,320	2 2 2	RES 5.6kohm 5% ¼W	328562J
	R323,324	2 2 2	RES 4.7kohm 5% ¼W	328472J
	R325,326	2 2 2	RES 2.2kohm 5% ¼W	328222J
	R327,328	2 2 2	RES 4.7kohm 5% ¼W	328472J
	R329,330	2 2 2	RES 12kohm 5% ¼W	328123J
	R331,333	2 2 2	FP-RES 1kohm 5% ¼W	328102L
	R333,334	2 2 2	RES 6.8kohm 5% ¼W	328682L
	R335	1 1 1	RES 10kohm 5% ¼W	328103J
	R336,337	2 2 2	RES 68ohm 5% ¼W	328680J
	R338	1 1 1	RES 10kohm 5% ¼W	328103J
			(BUFFER AMP SECTION)	
	S8	1 1 1	Switch, push – SUF-1P – subsonic filter	4041510
	Q501,502	2 2 2	FET 2SK150A (GR)	516038S
	Q503~506	4 4 4	TR 2SC1845 (E or F)	512115S
	Q507~510	4 4 4	TR 2SA992 (E or F)	510110S
	Q511,512	2 2 2	TR 2SD666 (B or C)	511019S
	Q513,514	2 2 2	TR 2SB646 (B or C)	511119S
	D501~504	4 4 4	Diode 1S2076	501019S
	C509,510	2 2 2	M-CAP 0.33μf 10% 100V	281334K
	C511,512	2 2 2	M-CAP 0.33μf 10% 50V	222333K
	C513,514	2 2 2	C-CAP 47pf 10% 50V SL	232470K
	C515,516	2 2 2	M-CAP 0.0022μf 10% 50V	222222K
	C517~520	4 4 4	C-CAP 5pf 10% 50V SL	232509D
	C521,522	2 2 2	M-CAP 0.047μf 10% 50V	222473K
	C523,524	2 2 2	C-CAP 15pf 10% 50V SL	232150K
	C525,526	2 2 2	M-CAP 3.3μf 10% 100V	281335K
	C527,528	2 2 2	C-CAP 220pf 10% 50V SL	232221K
	R515,516	2 2 2	RES 1meg-ohm 5% ¼W	328105J
	R517,518	2 2 2	RES 68kohm 5% ¼W	328683J
	R519,520	2 2 2	RES 100ohm 5% ¼W	328101J
	R521,522	2 2 2	RES 1meg-ohm 5% ¼W	328105J
	R523,524	2 2 2	RES 2.2kohm 5% ¼W	328222J
	R525~528	4 4 4	RES 3.3kohm 5% ¼W	328332J
	R529,530	2 2 2	RES 10kohm 5% ¼W	328103J
	R531,532	2 2 2	RES 33kohm 5% ¼W	328333J
	R533,534	2 2 2	RES 8.2kohm 5% ¼W	328822J
	R535,536	2 2 2	RES 3.3kohm 5% ¼W	328332J
	R537,538	2 2 2	RES 1kohm 5% ¼W	328102J
	R539~542	4 4 4	RES 39kohm 5% ¼W	328393J
	R542~546	4 4 4	FP-RES 47ohm 5% ¼W	328470L
	R547,548	2 2 2	RES 3.3kohm 5% ¼W	328332J
	R549,550	2 2 2	RES 820ohm 5% ¼W	328821J
	R551,552	2 2 2	RES 100ohm 5% ¼W	328101J
	R553,554	2 2 2	RES 220kohm 5% ¼W	328224J
	R555,556	2 2 2	RES 39kohm 5% ¼W	328393J
			(MUTING SECTION)	
	RY901	1 1 1	Reed relay – FRL-644D12	1700140
	Q901	1 1 1	TR 2SC1845 (E or F)	512115S
	D901	1 1 1	Diode 1S2076	501019S
	D902	1 1 1	Diode 1S2076A	501020S
	ZD901	1 1 1	Zener diode RD6.2EB2	502048S
	C901	1 1 1	E-CAP 100μf 10V	211130Q
	R902	1 1 1	RES 150kohm 5% ¼W	328154J
	R903	1 1 1	FP-RES 220ohm 5% ¼W	328221L
			(REGULATOR SECTION)	
	Q801	1 1 1	FET 2SK106 (B)	516033S
	Q802	1 1 1	TR 2SC2275A (P or Q)	512121S

KEY NO.	SYMBOL NO.	TYPE+ W E B	DESCRIPTION++	PART NO.
	Q803,804	2 2 2	TR 2SC1845 (E or F)	512115S
	Q805	1 1 1	FET 2SK106 (B)	516033S
	Q806	1 1 1	TR 2SA985A (P or Q)	510119S
	Q807,808	2 2 2	TR 2SA992 (E or F)	510110S
	Q809	1 1 1	FET 2SK106 (B)	516033S
	Q810	1 1 1	TR 2SC2275 (P or Q)	512120S
	Q811,812	2 2 2	TR 2SC1845 (E or F)	512115S
	Q813	1 1 1	FET 2SK106 (B)	516033S
	Q814	1 1 1	TR 2SA985 (P or Q)	510118S
	Q815,816	2 2 2	TR 2SA992 (E or F)	510110S
	ZD801~804	4 4 4	Zener diode RD8.2EB1	502052S
	C803	1 1 1	M-CAP 0.01μf 10% 100V	226103K
	C804	1 1 1	E-CAP 100μf 10V	211130Q
	C805,806	2 2 2	E-CAP 10μf 100V	211820Q
	C808	1 1 1	M-CAP 0.01μf 10% 100V	226103K
	C809	1 1 1	E-CAP 100μf 10V	211130Q
	C810,811	2 2 2	E-CAP 10μf 100V	211820Q
	C814	1 1 1	M-CAP 0.01μf 10% 50V	222103K
	C815	1 1 1	E-CAP 100μf 10V	211130Q
	C816,817	2 2 2	E-CAP 10μf 50V	211520Q
	C819	1 1 1	M-CAP 0.01μf 50V	222103K
	C820	1 1 1	E-CAP 100μf 10V	211130Q
	C821,822	2 2 2	E-CAP 10μf 50V	211520Q
	R801	1 1 1	FP-RES 150ohm 5% ¼W	328151L
	R802,803	2 2 2	RES 33kohm 5% ¼W	328333J
	R804	1 1 1	RES 470kohm 5% ¼W	328474J
	R805	1 1 1	FP-RES 3.9kohm 5% ¼W	328392L
	R806	1 1 1	FP-RES 150ohm 5% ¼W	328151L
	R807,808	2 2 2	RES 33kohm 5% ¼W	328333J
	R809	1 1 1	RES 470kohm 5% ¼W	328474J
	R810	1 1 1	FP-RES 3.9kohm 5% ¼W	328392L
	R811	1 1 1	FP-RES 150ohm 5% ¼W	328151L
	R812	1 1 1	RES 15kohm 5% ¼W	328153J
	R813	1 1 1	RES 12kohm 5% ¼W	328123J
	R814	1 1 1	FP-RES 3.9kohm 5% ¼W	328392L
	R815	1 1 1	FP-RES 150ohm 5% ¼W	328151L
	R816	1 1 1	RES 15kohm 5% ¼W	328153J
	R817	1 1 1	RES 12kohm 5% ¼W	328123J
	R818	1 1 1	FP-RES 3.9kohm 5% ¼W	328392L
			POWER–TONE PC BOARD ASSEMBLY	
			(TONE CONTROL SECTION)	
	VR3	1 1 1	VR GM70EE90C – 100kohm x 2 – bass	4321080
	VR4	1 1 1	VR GM70EE89C – 100kohm x 2 – treble	4321090
	C501,502	2 2 2	M-CAP 0.056μf 10% 50V	222563K
	C503,504	2 2 2	M-CAP 0.22μf 10% 50V	222224K
	C505,506	2 2 2	M-CAP 0.0033 10% 50V	222332K
	C507,508	2 2 2	M-CAP 0.018μf 10% 50V	222183K
	R501,502	2 2 2	RES 1.5kohm 5% ¼W	328152J
	R503,504	2 2 2	RES 15kohm 5% ¼W	328153J
	R507,508	2 2 2	RES 3.9kohm 5% ¼W	328392J
	R511,512	2 2 2	RES 680ohm 5% ¼W	328681J
	R557,558	2 2 2	RES 1meg-ohm 5% ¼W	328105J
			(HEAD PHONES SECTION)	
*404		1 1 1	Jack, head phones	4550300
	IC601	1 1 1	IC LA4170	518089S
	C601,602	2 2 2	E-CAP 4.7μf 35V	211415Q
	C603,604	2 2 2	E-CAP 10μf 16V	211220Q
	C605,606	2 2 2	E-CAP 100μf 16V	211230Q
	C607,608	2 2 2	M-CAP 0.01μf 10% 50V	222103K
	C609	1 1 1	E-CAP 33μf 16V	211223Q
	R601,602	2 2 2	RES 10kohm 5% ¼W	328103J
	R603,604	2 2 2	RES 2.2kohm 5% ¼W	328222J
	R605,606	2 2 2	RES 39ohm 5% ¼W	328390J

PART ORDERING PROCEDURE ----- DO NOT USE THE "KEY" NUJBER AND "SYMBOL" NUMBER. (these are control # for the factory only.) Include in any order: a. Part number, b. Part description, c. Model number. (any of the above lacking from an order may delay shipment of the order.)

KEY NO.	SYMBOL NO.	TYPE+ W E B	DESCRIPTION++	PART NO.
	R607,608	2 2 2	RES 1kohm 5% ¼W	328102J
			(REGULATOR SECTION)	
	Q817	1 1 1	TR 2SC2275 (P or Q)	512120S
	D801	1 1 1	Diode W04	560068S
	D802,803	2 2 2	Diode W02	560061S ⚠
	D804	1 1 1	Diode 1S2076A	501020S ⚠
	ZD805	1 1 1	Zener diode RD15EB2	502050S
	C801,812	2 2 2	C-CAP 0.01μf 500V	238103P
	C802,807	2 2 2	E-CAP 470μf 100V	217835Q
	C813,818	2 2 2	E-CAP 470μf 50V	211535Q
	C823	1 1 1	E-CAP 470μf 25V	211335Q
	C824	1 1 1	E-CAP 47μf 16V	211225Q
	C825	1 1 1	E-CAP 100μf 16V	211230Q
	C826	1 1 1	E-CAP 33μf 25V	211323Q

KEY NO.	SYMBOL NO.	TYPE+ W E B	DESCRIPTION++	PART NO.
	R819	1 1 1	FP-RES 10ohm 5% ¼W	328100L
	R820	1 1 1	FP-RES 680ohm 5% ¼W	328681L
	R901	1 1 1	FP-RES 1kohm 5% ½W	329102L
			(PRIMARY POWER SECTION)	
	C001	1 – –	M-CAP 0.01μf	284103P
	C001	– 1 1	M-CAP 0.01μf	283103P
	LED901	1 1 1	LED BR5504S	5060300
		1 1 1	Spacer, LED	7903110

SEMICONDUCTOR DATA

TRANSISTORS

† NOTES Ge: Germanium Si: Sillicon

A: Alloy B: Base D: Diffused Dd: Double-diffused

Df: Drift-field E: Epitaxial G: Grown J: Junction

M: Mesa P: Planer Pc: Point-contact Td: Triple-diffused

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute-Maximum Values: (T_A = 25°C unless otherwise specified)					ELECTRICAL CHARACTERISTICS Typical Values: (T_A = 25°C unless otherwise specified)											MANUFACTURER
			Collector-to-Base Voltage V_{CBO} (V)	Emitter-to-Base Voltage V_{EBO} (V)	Collector Current I_C (mA)	Collector Dissipation P_C (mW)	Junction Temperature T_J (°C)	Collector Cutoff Current I_{CBO} (uA)	V_{CB} (V)	Static Forward-Current Transfer Ratio h_{FE}	V_{CE} (V)	I_C (mA)	Collector-Emitter Saturation Voltage $V_{CE(sat)}$ (V)	I_C (mA)	I_B (mA)	Gain-Bandwidth Product f_T f_{ob}* (MHz)	V_{CE} V_{CB}* (V)	I_E I_C* (mA)	Output Capacitance C_{ob} (pF)	Others	
2SA798 (F, G)	AF, Low noise Diff. amp	PNP Si-EP	−70	−5	−100	200/unit	125	−0.1 max.	−35	250 ~ 800	−6	−1	−0.6 max.	−10	−1	100	−6	1	3	Dual transistor	MITSUBISHI
2SA916 (L, K)	AF, Pre driver	PNP Si-E	−160	−5	−50	800	150	−0.1 max.	−160	135 ~ 400	−10	−10	−0.6 max.	−20	−2	80	−10	10	3.5 max.	Complementary to 2SC1941	N E C
2SA985 (P, Q)	AF, Power amp.	PNP Si-E	−120	−5	−1.5A	25W (Tc=25°C)	150	−1 max.	−120	100 ~ 320	−5	−300	−2 max.	−1A	−100	180	−5	−200*	29	Complementary to 2SC2275	N E C
2SA985A (P, Q)	AF, Power amp.	PNP Si-E	−150	−5	−1.5A	25W (Tc=25°C)	150	−1 max.	−120	100 ~ 320	−5	−300	−2 max.	−1A	−100	180	−5	−200*	29	Complementary to 2SC2275A	N E C
2SA991 (E, F)	AF, Low noise	PNP Si-E	−60	−5	−100	500	125	−0.05 max.	−60	300 ~ 800	−6	−1	−0.5 max.	−100	−10	90	−6	1	10 max.	Complementary to 2SC1844	N E C
2SA992 (E, F)	AF, Low noise	PNP Si-E	−120	−5	−50	500	125	−0.05 max.	−120	300 ~ 800	−6	−1	−0.3 max.	−10	−1	100	−6	1	3 max.	Complementary to 2SC1845	N E C
2SA1015 (Y, GR)	AF, General	PNP Si-E	−50	−5	−150	400	125	−0.1 max.	−50	120 ~ 400	−6	−2	−0.3 max.	−100	−10	80 min.	−10	−10*	7 max.	Complementary to 2SC1815	TOSHIBA
2SB646 (B, C)	AF, Pre driver	PNP Si-E	−120	−5	−50	900	150	−10 max.	−100	60 ~ 200	−5	−10	−2 max.	−30	−3	140	−5	−10*	4	Complementary to 2SD666	HITACHI
2SB647 (B, C)	AF, Driver	PNP Si-E	−120	−5	−1A	900	150	−10 max.	−100	60 ~ 200	−5	−150	−1 max.	−500	−50	140	−5	−150*	20	Complementary to 2SD667	HITACHI
2SB718 (B, C)	AF, High voltage amp.	PNP Si-E	−200	−5	−50	1250	150	−10 max.	−160	60 ~ 200	−5	−10	−2 max.	−30	−3	140	−5	−10*	5.5	Complementary to 2SD758	HITACHI
2SC1583 (F, G)	AF, Low noise Diff. amp	NPN Si-EP	70	5	100	200/unit	125	0.1 max.	35	250 ~ 800	6	1	0.6 max.	10	1	150	6	−1	2.5	Dual transistor	MITSUBISHI
2SC1815 (Y, GR)	AF, General	NPN Si-E	60	5	150	400	125	0.1 max.	60	120 ~ 400	6	2	0.25 max.	100	10	80 min.	10	1*	3 max.	Complementary to 2SA1015	TOSHIBA
2SC1844 (E, F)	AF, Low noise	NPN Si-E	60	5	100	500	125	0.05 max.	60	300 ~ 800	6	1	0.3 max.	100	10	100	6	−1	8 max.	Complementary to 2SA991	N E C
2SC1845 (E, F)	AF, Low noise	NPN Si-E	120	5	50	500	125	0.05 max.	120	300 ~ 800	6	1	0.3 max.	10	1	110	6	−1	2.5 max.	Complementary to 2SA992	N E C
2SC1941 (L, K)	AF, Pre driver	NPN Si-E	160	5	50	800	150	0.1 max.	160	135 ~ 400	10	10	0.6 max.	20	2	120	10	−10	3 max.	Complementary to 2SA916	N E C
2SC2275 (P, Q)	AF, Power amp.	NPN Si-E	120	5	1.5A	25W (Tc=25°C)	150	1 max.	120	100 ~ 320	5	300	2 max.	1A	100	200	5	200*	19	Complementary to 2SA985	N E C
2SC2275A (P, Q)	AF, Power amp.	NPN Si-E	150	5	1.5A	25W (Tc=25°C)	150	1 max.	120	100 ~ 320	5	300	2 max.	1A	100	200	5	200*	19	Complementary to 2SA985A	N E C
2SD666 (B, C)	AF, Pre driver	NPN Si-E	120	5	50	900	150	10 max.	100	60 ~ 200	5	10	2 max.	30	3	140	5	10*	3	Complementary to 2SB646	HITACHI
2SD667 (B, C)	AF, Driver	NPN Si-E	120	5	1A	900	150	10 max.	100	60 ~ 200	5	150	1 max.	500	50	140	5	150*	12	Complementary to 2SB647	HITACHI
2SD758 (B, C)	AF, High voltage amp.	NPN Si-E	200	5	50	1250	150	10 max.	160	60 ~ 200	5	10	2 max.	30	3	140	5	10*	3.8	Complementary to 2SB718	HITACHI

FIELD EFFECT TRANSISTOR

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute-Maximum Values: (T_A = 25°C unless otherwise specified)						ELECTRICAL CHARACTERISTICS Typical Values: (T_A = 25°C unless otherwise specified)																MANUFACTURER
			Gate-to-Drain Voltage V_{GDO} (V)	Gate-to-Source Voltage V_{GSO} (V)	Gate Current I_G (mA)	Drain Current I_D (mA)	Total Dissipation P_D (mW)	Channel Temperature T_{ch} (°C)	Gate Leak Current Test Conditions	Gate Leak Current I_{GSS} (nA)	Gate to Drain Breakdown Voltage Test Conditions	Gate to Drain Breakdown Voltage $V_{(BR)GDO}$ (V)	Drain Current Test Conditions	Drain Current I_{DSS} (mA)	Gate to Source Cutoff Voltage Test Conditions	Gate to Source Cutoff Voltage $V_{GS(off)}$ (V)	Forward Transfer Admittance Test Conditions	Forward Transfer Admittance $\|Y_{fs}\|$ (mS)	Feed Back Capacitance Test Conditions	Feed Back Capacitance C_{rss} (pF)	Power Gain (Common Source) Test Conditions	Power Gain (Common Source) G_{PS} (dB)	Noise Figure Test Conditions	Noise Figure NF (dB)	
2SK106 (B)	AF, Low noise	Si N-channel junction	−50	−50	10	20	300	125	V_{GS} = -30V V_{DS}=0V	−10 max.			V_{DS} = 10V V_{GS}=0V	1 ~ 3	V_{DS} = 10V I_D=10μA	−1.5 max.	V_{DS} = 10V I_D=0.5 mA f=1kHz	3.5 min.							HITACHI
2SK146 (GR)	AF, Low noise Differential amp.	Si N-channel junction (Dual)	−40	−40	10		600/ unit	125	V_{GS} = -30V V_{DS}=0V	− 1 max.			V_{DS} = 10V V_{GS}=0V	5 ~ 10			V_{DS} = 10V V_{GS}=0V I_D = 0 f= 1kHz I_{DSS} = 5mA	40	V_{DG} = 10V I_D = 0 f= 1MHz	15			V_{DG} = 10V R_g=100Ω I_D=5mA f= 1kHz	1	TOSHIBA
2SK150 (GR)	AF, Low noise Differential amp.	Si N-channel junction (Dual)	−50	−50	10		200/ unit	125	V_{GS} = -30V V_{DS}=0V	− 1 max.			V_{DS} = 10V V_{GS}=0V	2.6 ~6.5			V_{DS} = 10V V_{GS}=0V I_D = 0 f= 1MHz I_{DSS} = 3mA	12	V_{DG} = 10V I_D = 0 f= 1MHz	3			V_{DS} = 10V R_g = 1kΩ I_D = 1mA f= 1kHz	2 max.	TOSHIBA

DIODES, LED'S

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute - Maximum Values: (T_A = 25°C unless otherwise specified)								ELECTRICAL CHARACTERISTICS Typical Values: (T_A = 25°C unless otherwise specified)							MANUFACTURER
			Reverse Surge Voltage V_{RSURGE} (V)	Peak Reverse Voltage V_{RM} (V)	Reverse Voltage V_R (V)	Peak Forward Voltage V_{FM} (V)	Peak Forward Current I_{FM} (mA)	Average Rectified Current I_O (mA)	Forward Surge Current $I_{F\,surge}$ (A)	Junction Temperature T_J (°C)	Total Power Dissipation P_D (mW)	Forward Current I_{Fmin} (mA)	Forward Current Test Condition V_F (V)	Forward Voltage V_{Fmax} (V)	Forward Voltage Test Condition I_F (mA)	Reverse Current I_{Rmax} (uA)	Reverse Current Test Condition V_R (V)	Others	
W02	Rectifier	Si-DJ (Bridge)			200	200		1.5A	50	125				1.0	1.0A	10		R_{th}=50°C/W	GENERAL INSTRUMENT
W04	Rectifier	Si-DJ (Bridge)			400	400		1.5A	50	125				1.0	1.0A	10		R_{th}=50°C/W	GENERAL INSTRUMENT
IS2076	Medium speed switching	Si-EP		35	30		450	150						0.8	10	1	30		HITACHI
IS2076A	Medium speed switching	Si-EP		70	60		450	150						0.8	10	1	30		HITACHI
BR5504S	Lamp (red)	GaAlAs			4		300	$I_{F=50}$		85	100			2.0	20	100	4	Iv = 80 mcd (I_F = 20 mA)	STANLEY

ZENER DIODES

DEVICE TYPE	APPLICATIONS	STRUCTURE†	MAXIMUM RATINGS Absolute - Maximum Values: (T_A = 25°C unless otherwise specified)			ELECTRICAL CHARACTERISTICS Typical Values: (T_A = 25°C unless otherwise specified)												MANUFACTURER
			Total Power Dissipation P_D (mW)	Zener Current I_Z (A)	Junction Temperature T_J (°C)	Zener Voltage V_Z MIN (V)	V_Z TYP (V)	V_Z MAX (V)	V_Z Test Conditions I_Z (mA)	Differential Resistance r_Z TYP (Ω)	r_Z MAX (Ω)	Differential Resistance Test Conditions I_Z (mA)	Temperature Coefficient γ_Z TYP (%/°C)	γ_Z MAX (%/°C)	Temperature Coefficient Test Conditions I_Z (mA)	Reverse Current I_Z MAX (μA)	Reverse Current Test Conditions V_R (V)	Others	
RD6.2 -EB2	Regulator	Si-J	400		175	5.96		6.27	20		20	20				5	3.0		NEC
RD8.2 -EB1	Regulator	Si-J	400		175	7.53		7.92	20		10	20				2	5.0		NEC
RD15 -EB1	Regulator	Si-J	400		175	13.44		14.13	10		30	10				2	11		NEC
RD15 -EB2	Regulator	Si-J	400		175	13.89		14.62	10		30	10				2	11		NEC

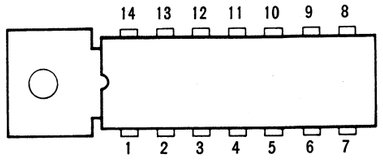
INTEGRATED CIRCUIT LA4170

- **APPLICATION: DUAL HEADPHONE AMPLIFIER**
- **MANUFACTURER: SANYO**

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

ITEM	SYMBOL	RATING	UNIT
Supply Voltage	Vcc	22	V
Supply Current	Icp	0.5	A
Power Dissipation	P_T	1050	mW
Operating Temperature	Topr	−20 ~ 70	°C
Storage Temperature	Tstg	−40 ~ 150	°C

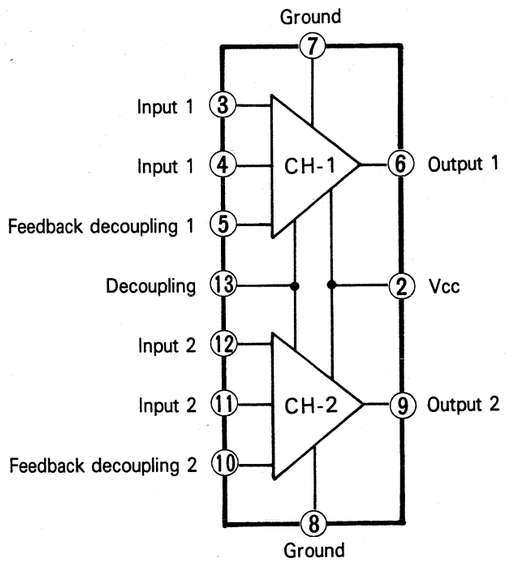
TERMINAL GUIDE (TOP VIEW)



ELECTRICAL CHARACTERISTICS (Ta = 25°C, Vcc = 14V, R_L = 8Ω, f = 1 kHz, Rg = 600Ω)

ITEM	SYMBOL	CONDITION	RATING MIN.	RATING TYP.	RATING MAX.	UNIT
Idling Current	Icco		6	8	15	mA
Voltage Gain	V_G	Vo = 77.5 mV	7	9	11	dB
Output Voltage	Vo	Vcc = 14V THD = 10%	0.58	0.68		V
Total Harmonic Distortion	THD	Vo = 0.1 V		0.5	1.0	%
Input Resistance	Ri	Vo = 0.2 V	20	30	40	kΩ
Output Noise Voltage	V_{NO}	Rg = 1 kΩ		6	18	μV
Channel Separation	CT	Rg = 1 kΩ	−50	−68		dB
Gain Difference					1.0	dB

BLOCK DIAGRAM



INTEGRATED CIRCUITS μA741C

- **Manufacturer:** FAIRCHILD
- **Applications:** Operational Amplifier

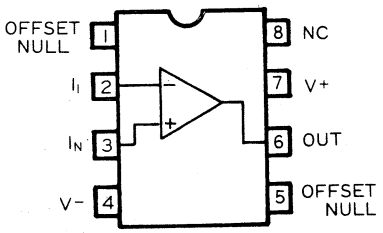
ABSOLUTE MAXIMUM RATINGS

Supply Voltage	±18 V	Input Voltage	±15 V
Internal Power Dissipation	310 mW	Storage Temperature Range	−55°C to + 125°C
Differential Input Voltage	±30 V	Operating Temperature Range	0°C to + 70°C

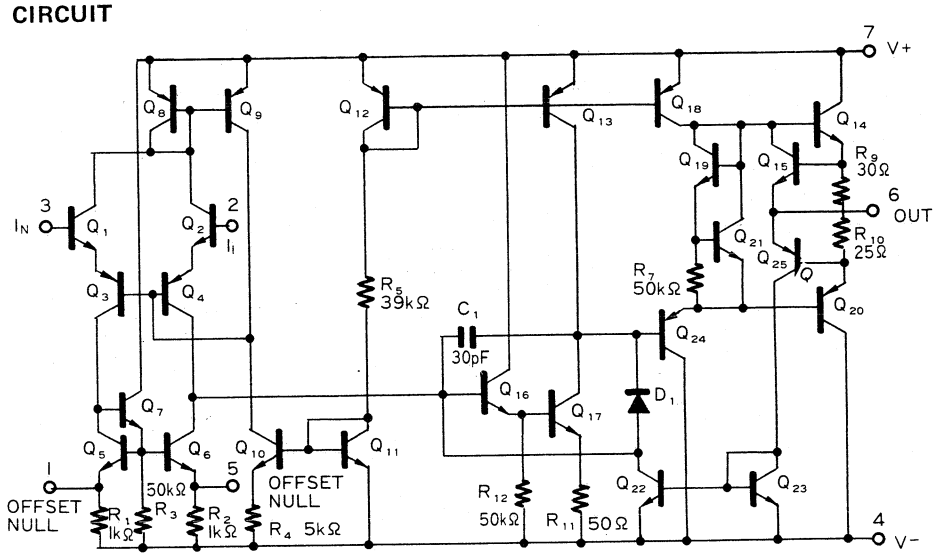
ELECTRICAL CHARACTERISTICS (V_{CC} = ±15V, T_A = +25°C unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Offset Voltage	$R_S \leq 10\,k\Omega$		2.0	6.0	mV
Input Offset Current			20	200	nA
Input Bias Current			80	500	nA
Large-Signal Voltage Gain	$R_L \geq 2\,k\Omega$ $V_{out} = \pm 10V$	106	126		dB
Output Voltage Swing	$R_L \geq 10\,k\Omega$	±12	±14		V
Common Mode Rejection Ratio	$R_S \leq 10\,k\Omega$	70	90		dB
Supply Voltage Rejection Ratio	$R_S \leq 10\,k\Omega$		30	150	μV/V
Power Consumption			50	85	mW

TERMINAL GUIDE (TOP VIEW)



EQUIVALENT CIRCUIT



INTEGRATED CIRCUITS AN6552

- **Manufacturer:** MATSUSHITA
- **Applications:** Dual Operational Amplifier

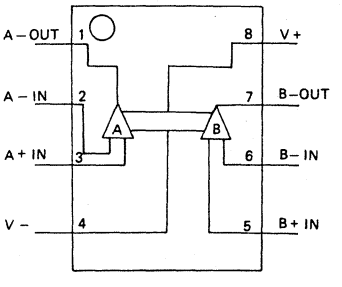
ABSOLUTE MAXIMUM RATINGS

Supply Voltage	±18 V	Input Voltage	±15 V
Internal Power Dissipation	500 mW	Storage Temperature Range	−40°C to +125°C
Differential Input Voltage	±30 V	Operating Temperature Range	−20°C to +75°C

ELECTRICAL CHARACTERISTICS (V_{CC} = ±15V, T_A = +25°C unless otherwise noted.)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Offset Voltage	$R_S \leqslant 10\ k\Omega$		0.5	6.0	mV
Input Offset Current			5	200	nA
Input Bias Current				500	nA
Large-Signal Voltage Gain	$R_L \geqslant 2\ k\Omega$ V_{out} = ±10V	86	100		dB
Output Voltage Swing	$R_L \geqslant 2\ k\Omega$	±10	±13		V
Common Mode Rejection Ratio	$R_S \leqslant 10\ k\Omega$	70	90		dB
Supply Voltage Rejection Ratio	$R_S \leqslant 10\ k\Omega$		30	150	μV/V
Slew Rate	$R_L \geqslant 2\ k\Omega$		1		V/μS

TERMINAL GUIDE (TOP VIEW)



SCHEMATIC DIAGRAM (1/2 CIRCUIT)